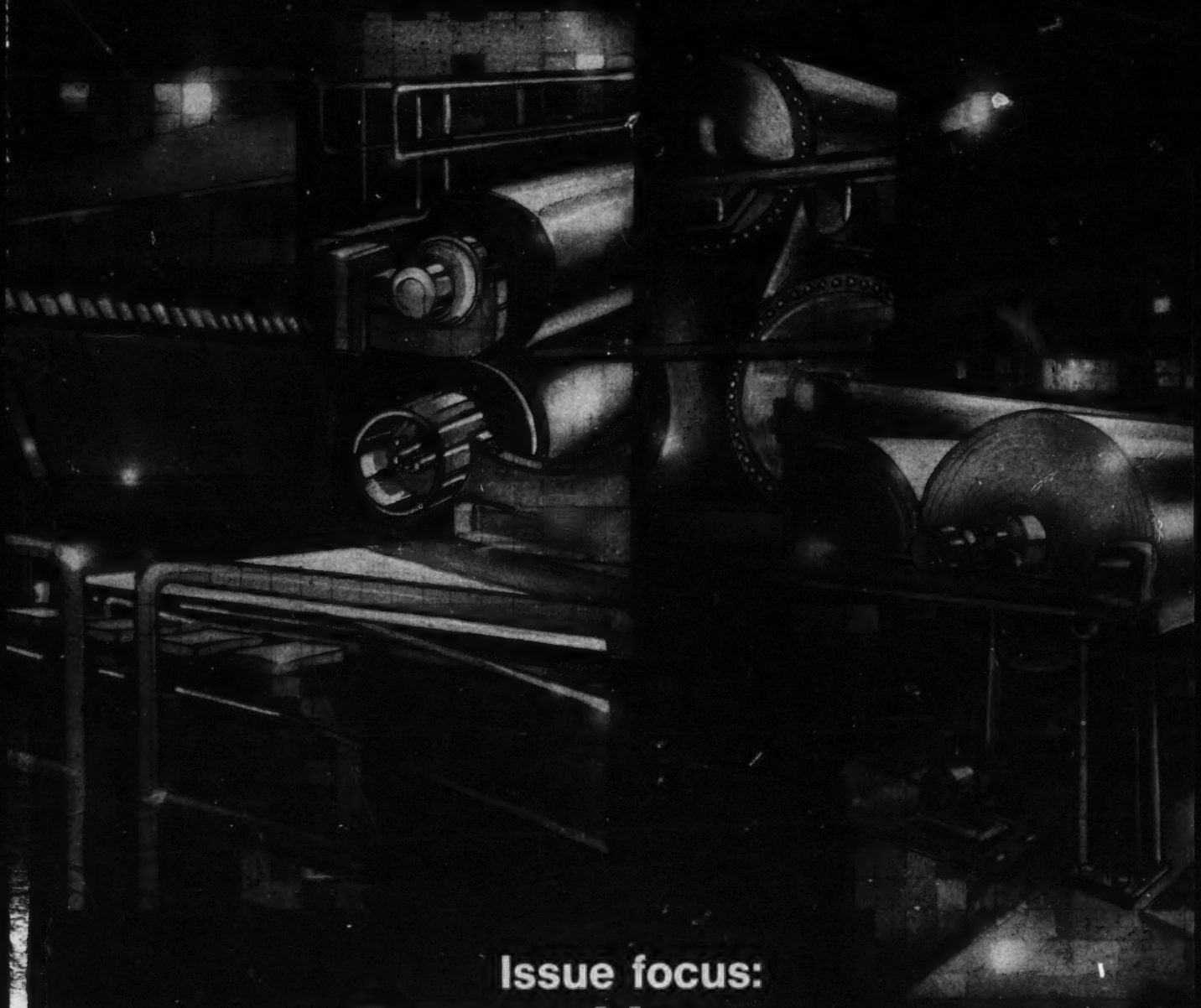
PULP & PAPER

April 1982

C3975-2 4/20/82

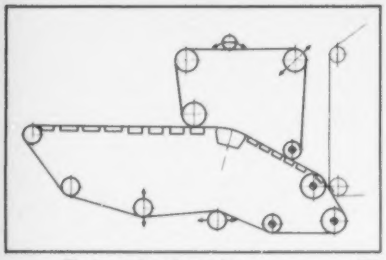


Issue focus: Papermaking— latest trends, technology

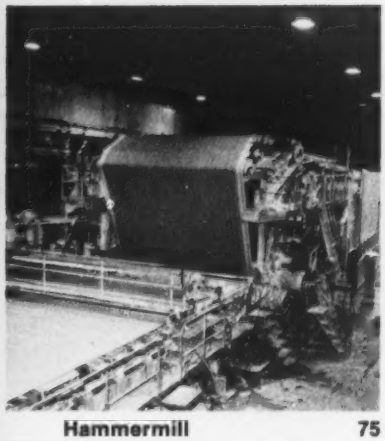
CCA's new woodwaste boiler at Brewton, Ala. 136

PULP&PAPER

Volume 56 Number 4 April 1982

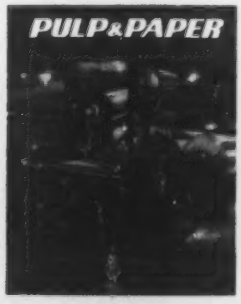


Twin-wire forming 70



Hammermill 75

Cover: Applied technology and latest trends in papermaking are the subjects of a special nine-article highlight in this issue (cover art by Rik Olson).



ISSUE FOCUS: Papermaking

70 **Twin-wire Forming Conference** focuses on machine configurations used worldwide, recent forming developments, trends

98 **Paper colorants:** review of synthetic dyes, pigments used in the paper industry; current technology, future trends analyzed

115 **Multilayer felts** provide maximum performance in modern press sections; highly incompressible felts will be future trend

138 **New vacuum unit offers low energy/water use,** increased operating flexibility, low installation costs, hot air recovery

140 **New headbox pH controller** maintains 0.2 deviation at Weyco mill

141 **Whitewater recycling system** uses centrifugal filters for high efficiency, maximum fiber/heat recovery

154 **Advanced instrumentation, automation techniques** have been applied to paper machine wet end operations to improve process control

172 **Forming fabrics for twin-wire formers:** clothing selection and performance for various configurations used in North America

188 **Inexpensive, simple modifications to press section equipment** and felt design can improve water-removal efficiency

Mill operations

75 **Hammermill fine paper machine rebuild** at Erie, Pa., includes new press section, additional dryers, computer control system

93 **Sulfite pulping review/update:** existing mills that have made environmental upgrades should survive into foreseeable future

118 **CPPA technical session** covers broad range of manufacturing topics

122 **Chesapeake upgrades caustic area** at West Point, Va.

136 **CCA's new steam, electrical-generation complex** at Brewton, Ala.

170 **New Celotex roofing felt mill** uses glass fibers in place of pulp; $12-million facility located at Russellville, Ala.

194 **Medium-consistency pulp mill** seen as dominant operation in future; industry consultant reviews developments, new technology

Engineering/maintenance

97 **Continuous-wire welder** restores refiner head thickness

133 **Power use in pumps** can be reduced by proper maintenance, rebuilding when internal clearances wear

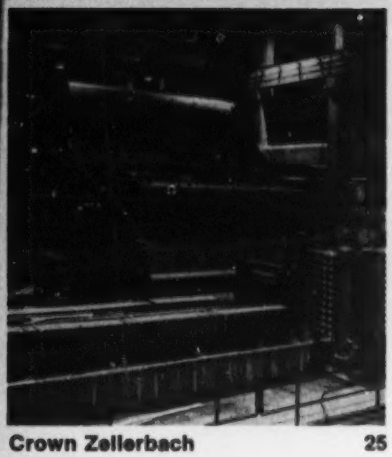
175 **Byproduct power output improved** by full use of available steam

Table of contents continued on page 5

PULP & PAPER (ISSN 0033-4081) is published monthly except November when semi-monthly by MILLER FREEMAN PUBLICATIONS, 500 Howard St., San Francisco, Calif. 94105. Second class postage paid at San Francisco, CA, and at additional mailing office. POSTMASTER: Please send Form 3579 to PULP & PAPER, 500 Howard St., San Francisco, Calif. 94105.

*Copyright 1982 by Miller Freeman Publications Inc.
All rights reserved.

ABP BPA



Crown Zellerbach 25

Hoelzinger 207

Choate 215

Borden 262

Engineering/maintenance . . . continued

192 **Digester inspection costs, downtime reduced** with remote TV unit
193 **Dust problems** in the manufacture of paper products for medical field solved with special web-cleaning system

Management

151 **Slow '82 seen for Canada,** CPPA told—pulp/newsprint face slump

NEWS

9 **News Summary** —News Roundup, News of People, and Supplier News
11 **Month in Statistics** —U.S. paper and paperboard production
13 **Marketing Roundup** —Pulp, liner, coated, and roto pricing
25 **News Roundup** —Linerboard mill planned for Southeast; plus other news
41 **International News** —Output reports from Europe; production drop in Japan; Socialist plans for French industry
43 **Regulatory Roundup** —Reagan seeks to ease Water Act; EPA fiscal '83 budget slashed; EPA rules on stack heights
49 **Grade Profile** —Uncoated freesheets
51 **Conference Calendar** —with TAPPI Coating Conference and TAPPI/CPPA Technical Section International Pulp Bleaching Conference program notes

COLUMNS

7 **Editors' Notebook** —Papermaking; Jesse H. Neal Awards
45 **Washington Viewpoint** —Getting trade policy out of Washington
47 **Labor/Management** —Human resource manager as planner
205 **Career Development** —New job, new department
215 **Maintenance Tips** —TDS solids meters; Splicing thermocouple wires
245 **Chemical Markets** —Polyvinyl alcohol
262 **Comment** —Congress should expedite RARE II

DEPARTMENTS

207 **News of People**
219 **New Products**
229 **Product Review**
233 **Literature**
241 **Bookshelf**
241 **Letters to the Editor**
246 **Supplier News**

SERVICES

213 **Readers Service Card**
217 **Readers Service Index**
251 **Professional Service Directory**
253 **Classified Advertising**
260 **Advertisers Index**

Subscriptions & Address Changes: Sent without charge in the U.S.A. & Canada (upon written request) to management, production, technical, engineering, maintenance and other supervisory personnel in pulp, paper and board manufacturing firms and paper converting firms. To all others there is a subscription charge of $35.00 a year in the U.S. All subscriptions to other countries: $50.00 a year, except Europe and Mediterranean, $60.00 (air service included). Single copy, $3.50, except Buyers Guide, $20.00. Photocopies of articles and complete microform volumes available through University Microfilms International, 300 N. Zeeb Rd., Ann Arbor, Mich. 48106.

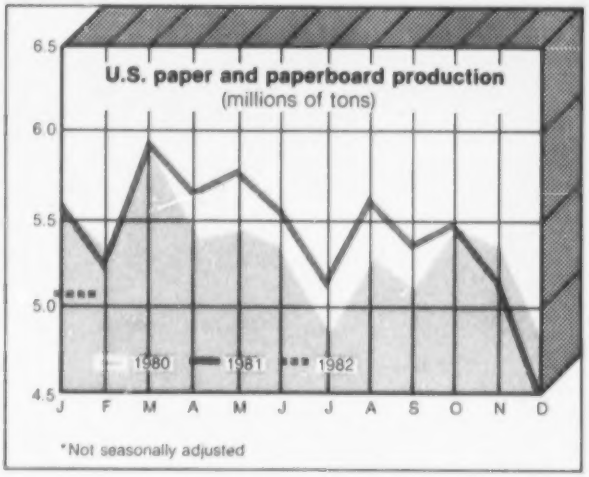
Requests, subscription orders and address changes must show name and position or job of individual, name and location of mill, plant or office where employed, and exact business or product produced at this location. **Send subscription correspondence to:** Circulation Department, PULP & PAPER, 500 Howard St., San Francisco, Calif. 94105. For address change, include label from recent issue.

MONTH IN STATISTICS

U.S. paper and paperboard production leveled off somewhat in January, totaling about 5.1 million short tons in the month, 8% below year-earlier production levels, according to the American Paper Institute. Adjusted for seasonal and workday factors, the rate of production, measured by the December 1981-January 1982 average, was at 60.7 million tpy, only slightly below the November-December 1981 rate.

Among major grades, paper production in Janauary was close to November 1981 levels. With the exception of newsprint, tissue, and uncoated free-sheet paper, production of major paper grades was well below year-earlier levels. In paperboard, the largest impact fell on containerboard production for domestic use, particularly unbleached kraft linerboard. And the Fibre Box Assn. reported that shipments of fiber boxes in January were 10% below their January 1981 level. Production of containerboard for domestic use declined 13%.

Total Canadian newsprint shipments in January came to 671,000 metric tons, down 3.5% below a year ago, according to the Canadian Pulp & Paper Assn. Mill operating rates were 96%, matching year-earlier levels.



		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION[1]					
Newsprint	January	441	5.8	5,282	5.7
Uncoated groundwood (s)	January	115	−10.2	1,378	−10.5
Coated paper (s)	January	385	−9.4	4,625	−9.4
Uncoated free sheet (s)	January	655	−0.8	7,864	−0.7
Unbleached kraft packaging and industrial (s)	January	300	−11.0	3,600	−11.0
Tissue	January	375	−0.5	4,500	−0.5
Total paper	**January**	**2,526**	**−3.0**	**30,316**	**−3.0**
Kraft linerboard, unbleached	January	1,077	−12.9	12,926	−12.9
Semichemical medium	January	375	−8.1	4,503	−8.0
Bleached paperboard	January	305	−10.8	3,655	−11.0
Recycled paperboard	January	545	−12.8	6,542	−12.8
Total paperboard	**January**	**2,400**	**−11.4**	**28,802**	**−11.4**
Total paper and paperboard*	**January**	**5,066**	**−7.9**	**60,787**	**−7.9**
PULP, WASTEPAPER & FIBER[2]					
Total woodpulp production	December	3,590	−6.8	51,985	2.5
Market pulp production	December	419	−13.3	6,190	−4.6
Wastepaper consumption at paper/board mills	December	1,108	−2.8	15,409	3.3
Pulpwood consumption (cords)	January	5,658	−9.2	n.a.	n.a.
CONVERTED PRODUCTS STATISTICS[3]					
Corrugated box shipments (billion ft²)	January	18.961	−10.3	18.961†	−10.3
Containerboard inventories at box plants	Jan. 1	2,628	33.9		
INTERNATIONAL TRADE[2]					
U.S. paper imports (including products)	December	644	−7.5	8,341	−5.0
Imports of Canadian newsprint	December	557	−5.6	6,936†	−2.7
U.S. paper exports (including products)	December	338	−21.9	4,636	−11.1
Exports of unbleached kraft linerboard	January	1,077	−12.9	12,926	−12.9
Exports of woodpulp	December	315	−2.2	3,678	−3.4
CANADIAN STATISTICS[4] (reported in metric tons)					
Total newsprint shipments	January	671	−3.5	671†	−3.5
Operating rates	January	96%	96%	96%	96%
Inventories held by U.S. consumers	Jan. 31	1,539	32.0		
Woodpulp shipments (export only)	January	451	−16.9	451†	−16.9
Operating rates	January	90%	95%	90%	95%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fiber Box Assn., Paperboard Packaging Council. 4. Canadian Pulp & Paper Assn. *Includes construction and wet machine grades. †Not annualized. ‡Not directly comparable to year ago because of coding change. (s) = shipments.

WOOD PRODUCTS

U.S. wood exports forecast to 1990

U.S. wood exports may increase 93% over the current decade to a possible $7.0 billion by 1990, John R. Forrest, senior vice president, Boise Cascade Corp., told the recent Forest Industries Advisory Council meeting in Boca Raton, Fla. "The stage is set for excellent long-term world wood markets with the U.S. assuming a larger role," he said.

FORREST

Already during the past decade, offshore shipments of logs, lumber, and plywood rose approximately 50%, reaching about 1.0 billion ft³ in roundwood equivalent in 1980. Although logs are still the largest segment, there has been considerable growth in lumber and plywood exports, Forrest said. On a volume basis, exports of softwood and hardwood lumber have doubled, panel products have tripled, while logs exports increased 20%.

"As exporters, we are doing better than other manufacturing industries," he noted. "The U.S. share of world export markets for all manufactured goods declined from 19% during the last ten years. For the same period, the U.S. share of world wood imports increased from 13% to 18%."

Relative to production, lumber exports increased from about 3% in 1970 to 8% in 1980, while plywood moved from slightly over 1% to about 4%.

Future growth trends for wood exports from 1980 to 1990 were presented by Forrest based on projections developed by the National Forest Products Assn.

Shipments to Japan, currently the largest market for U.S. wood exports, are seen rising by more than 50% to $3.1 billion by 1990. While logs currently account for about two-thirds of shipments, exports of lumber, plywood and other manufactured products are expected to show the fastest growth if trade barriers can be eased. China, which bought $100 million in U.S. softwood logs in 1981, may lift U.S. wood products purchases to $600 million by 1990.

The U.S. currently is only the tenth-largest lumber supplier to the U.K. and accounts for only about 4% of lumber imports by the rest of Europe. Exports of all U.S. wood products to the EC are projected to more than double over the decade to nearly $1.6 billion by 1990, according to Forrest.

Projected U.S. exports of wood products, 1980-90
(millions of $)

By product	1980	1990	% change 1980/90
Softwood logs	1452	2013	38.6%
Softwood lumber	777	2070	166.4
Softwood plywood	95	445	368.4
Hardwood logs	129	265	105.4
Hardwood lumber	234	461	97.0
Hardwood veneer	106	222	109.4
Pulpwood & chips	387	540	39.5
All other	472	1025	117.2
Total	3652	7041	92.8
By destination			
Japan	2013	3120	54.9%
China	51	620	1115.7
Australia	47	110	134.0
Europe (EC)	725	1566	116.0
Middle East	72	265	268.1
Latin America	134	330	146.3
Canada	337	510	51.3
All other	273	520	90.5
Total	3652	7041	92.8

Source: National Forest Products Assn.

Huber plans new waferboard plant

J.M. Huber Corp. has begun design work for a $30-million waferboard plant in Easton, Maine. The 240-tpd plant will be the first to produce structural board on a caulless forming line, according to the company. The site of the plant is an old sugar beet refinery at Easton, which Huber is revitalizing to use as much of the existing facility as possible. NGM International has been retained to provide design, project management, construction management, and startup assistance.

Resources for the plant will come from Huber's Maine timber holdings as well as other purchased wood from the area. Excess woodwaste will generate steam for resale.

Maclaren buys wood products mills

James Maclaren Co. Ltd. bought 50% of Industries Maniwaki Ltd. and the option to acquire the remaining 50% within five years, and also purchased the 50% of Sogefor Ltd. that it did not already own. Sogefor, previously partly owned by the Quebec government's Société Générale de Financement du Québec, runs a particleboard mill at Lac des Iles, Que., while Maniwaki has a sawmill, veneer mill and parquet flooring mill in Maniwaki, Que.

• **Chesapeake Corp. of Virginia** has purchased a one-year-old hardwood sawmill near its West Point, Va., pulp and paper mill owned by West Point Log Co. Inc. The mill, which has a capacity of 8 million bd ft/year of lumber, will be started up when lumber market conditions improve.

• Sharon Steel Corp. has reached a tentative agreement with **Evans Products Co.** to acquire the 57% of Evans it doesn't already own in a share exchange with an indicated value of $150 million. Sharon is 86%-owned by **NVF Co.**, a maker of vulcanized fiber and plastic products, which in turn is controlled by Miami financier Victor Posner. The deal is expected to close in two months.

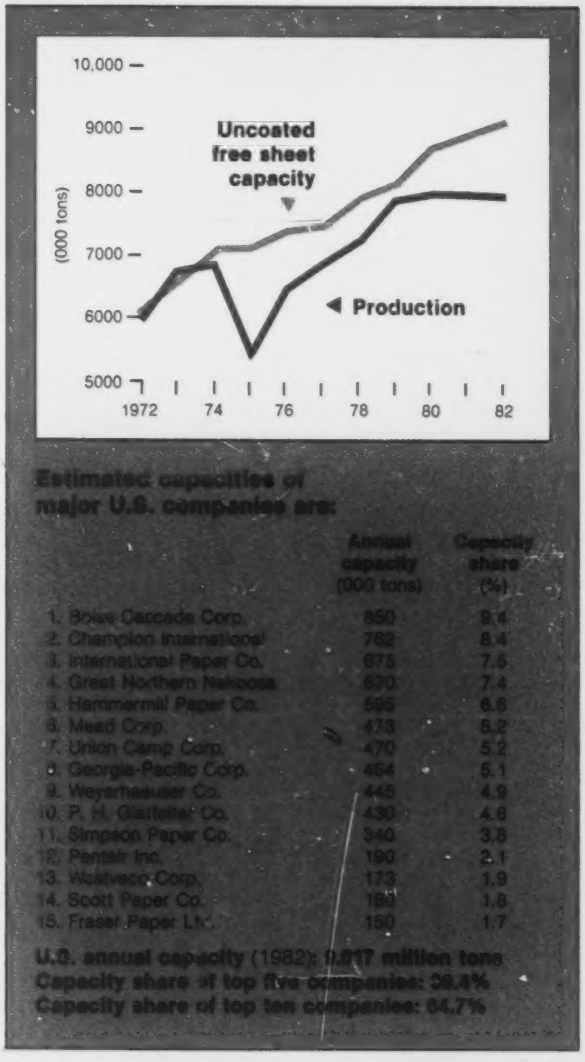
Although emphasizing its retail and transportation activities in recent years, Evans still owns about eight lumber, plywood and hardboard mills in British Columbia and the Pacific Northwest.

• **Masonite Corp.**, which has been the subject of takeover speculation, has a new major shareholder. The Pritzker family of Chicago recently aquired 10% interest in the timber and building products company, but a family member described the purchase as "strictly an investment."

Uncoated printing/writing papers: Markets weak, but modest pickup still possible in second half

Statistics	1980	1981	1982e
Production, 000 tons[1]	7983	7861	7850
Capacity, 000 tons	8645	8791	9017
Utilization rate, %	92.3	89.4	87.1
Imports, 000 tons	116	112	100
Exports, 000 tons	88	120	120
Apparent U.S. consumption			
000 tons	8011	7853	7830
lb/capita	72.0	69.9	70.0
000 tons/$billion real GNP	5.41	5.21	5.17

[1]API data for shipments



Estimated capacities of major U.S. companies are:

	Annual capacity (000 tons)	Capacity share (%)
1. Boise Cascade Corp.	850	9.4
2. Champion International	762	8.4
3. International Paper Co.	675	7.5
4. Great Northern Nekoosa	670	7.4
5. Hammermill Paper Co.	595	6.6
6. Mead Corp.	473	5.2
7. Union Camp Corp.	470	5.2
8. Georgia-Pacific Corp.	464	5.1
9. Weyerhaeuser Co.	445	4.9
10. P. H. Glatfelter Co.	430	4.8
11. Simpson Paper Co.	340	3.8
12. Pentair Inc.	190	2.1
13. Westvaco Corp.	173	1.9
14. Scott Paper Co.	161	1.8
15. Fraser Paper Ltd.	150	1.7

U.S. annual capacity (1982): 9,017 million tons
Capacity share of top five companies: 38.4%
Capacity share of top ten companies: 64.7%

Grade structure: Uncoated printing/writing papers include uncoated free-sheet grades with 10% or less mechanical pulp in the furnish. The two major subcategories are uncoated book and the printing and writing grades, with major end-uses including offset, bond, forms bond, reprographic, tablet, envelope, cover and text. Uncoated groundwood, bristols and thin papers are not considered part of this group.

Production/capacity: Production dropped by more than 1.5% in 1981 from the record pace of the previous year as most of the largest uncoated free-sheet grades—offset, bond and envelope—saw demand decline. This slide was only partially offset by healthy growth in forms bond demand. With capacity up by only about 1.7%, operating rates fell below 90%, hitting 89.4% for the year and about 85% for the fourth quarter.

After a 146,000-tpy capacity increase in 1981, capacity will rise by another 226,000 tpy in 1982, representing a 2.6% rise after the 1.7% increase of 1981. The boost for 1982 is close to the 2.7%/year growth forecast by American Paper Institute for the period through 1984, but it contrasts with a 3.5%/year average for the 1970s.

Outlook: Demand for major grades of uncoated free-sheet worsened through much of 1981 as consumers slashed inventories, and operating rates were still deteriorating going into early 1982. The inventory correction was expected to end during the second quarter and demand should begin to pick up by the fall, with cut-size sheets and forms bond leading a very modest recovery for the industry. Offset grades still suffer from competition by uncoated groundwood and coated paper, and the important book market is not expected to recover strongly this year from its current problems.

Pricing: Most mills raised prices by about 6% starting in June, but subsequent discounting eroded most of that jump—and in some cases, transaction price levels actually ended 1981 below where they had been at the start of the year, with list prices only 8% higher than December 1980 levels. With operating rates expected to average lower through 1982 than in 1981, price increases will be hard to push through and a successful hike is unlikely before the fall.

Because the category includes so many grades, two important grades have been chosen to track price trends (year-end, $/short ton): Book paper, No. 3 offset, 45-lb, sheets—1972, $460; 1974, $535; 1976, $506; 1978, $645; 1979, $711-$717; 1980, $813; 1981, $878. Forms bond, 15-lb, rolls—1972 not available; 1974, $470; 1976, $519-$520; 1978, $538-$550; 1979, $620; 1980, $697; 1981, $753.

Markets: Estimated shipments by end-uses are: bond, mimeo, duplicating, xerographic—24%; forms bond—20%; offset printing—24%; envelope—11%; tablet—4%; other—17%.

Future of sulfite pulping is tied to integrated mills, market pulp

Existing, environmentally adapted sulfite pulp mills should survive into the foreseeable future, but with limited growth—mainly in Europe, U.S.S.R.

By H.L. HERGERT

□ Bleached kraft pulp manufacture in the U.S. and Canada has expanded rapidly during the past two decades. This has created the impression among many papermakers that sulfite pulp is a dead issue. However, the fact is often overlooked that more than five million tons of installed sulfite pulp capacity still exists in these two countries. This tonnage represents an important resource to the papermaker and should raise important questions about its future.

To reasonably assess the future of sulfite pulp, it is necessary to understand why sulfite production has been more or less static for the last 30 years, while kraft pulp production has substantially increased. It is equally important to examine recent technical developments (that is, two-stage cooking, ultra-high-yield sulfite, neutral sulfite with anthraquinone) to determine whether new technology can preserve the sulfite process or even reverse the trend, compared with kraft.

Prior to World War II

Prior to World War II, sulfite pulp was the normal component of most commodity papers such as newsprint, coated book papers, and writing papers. Long-fibered, "white" softwoods (spruce, hemlock, true firs) were used almost exclusively. Cooking was done with calcium base, and spent cooking liquor was discharged into the nearest water course. Brightening of pulp was readily accomplished by simple bleaching agents, such as hypochlorite. Fiber strength was not critical because printing machines operated at modest speeds.

Post-Depression industrial expansion, population increases, and massive increases in shipments of goods overseas spawned the modern packaging industry. Linerboard and sack paper required good tear strength, which could be best provided by thick-walled pulp fibers derived from pine or Douglas fir. Neither of these types of wood could be readily pulped by the sulfite process. The kraft process was chosen on two counts: it accommodated these favored wood species, and it preserved the fiber's inherent tear strength. This "marriage" of favorable circumstances was further aided by the rapid advancement in kraft recovery boiler technology and by geography. Those parts of the country which happened to have remaining large stands of pulpwood (that is, the Southeast and Northwest) were mainly stocked with types of wood ideally suited for kraft pulping, which could not be used in the calcium-base sulfite process.

Sulfite pulping in the 1950s

Following World War II, and particularly during the 1950s, all types of industrial activity virtually exploded in Europe and Asia, as well as North America. This was accompanied by intense pressure for expansion of printing and business papers.

Existing sulfite mills were having to go farther and farther for a source of wood supply. The sulfite mills of Wisconsin, for example, had to get at least part of their spruce requirements from as far away as Montana or northern Ontario. At the same time, kraft mills in the South and the Northwest did not usually have to go more than 50 to 100 miles for their wood.

Rather cumbersome bleaching sequences were still required to brighten kraft pulp in the early 1950s; even then, whiteness did not come close to fully bleached sulfite pulp. Unfortunately for the sulfite process, invention of a practical means for chlorine dioxide bleaching in the mid-50s virtually eliminated this last barrier to the penetration of kraft mills into all aspects of paper production.

The final significant event was the belated discovery of the need for full integration in the forest products industry. Coniferous trees were becoming much too valuable to be indiscriminately used for pulpwood. The residues from sawn lumber and cull logs (not otherwise suitable for lumber production) became, as a matter of economic necessity, the most practical source of raw material for chemical pulp production. Chips from integrated operations could be most effectively pulped by the

Mr. Hergert is vice-president and director of technical marketing, ITT Rayonier Inc., Stamford, Conn.

kraft process. Also, the rapidly escalating value of softwood timber forced paper companies to closely examine hardwood resources. Effective use of hardwoods for paper, at least initially, required preservation of strength properties even more so than with softwoods. Neutral or alkaline pulping methods were clearly necessary for adequate burst and tear strength.

While sulfite pulp had long held the reputation for easier beating than kraft pulp, advancement in refining techniques in the 1950s not only permitted ready substitution of kraft for sulfite, but allowed retention of its superior tear properties.

From 1950s to present

All of these factors clearly show up in the statistics for kraft and sulfite pulp production over the last 30 years (see Table 1). Total bleached kraft paper production has increased 850%, while total sulfite has remained flat (1980 compared with 1950; actually, a case could be made for declining production if the peak of the mid-1960s is taken as a base). Most bleached pulp production goes into integrated paper operations. However, when examining that segment of pulp production going to market, the contrast appears even greater. Kraft market pulp has increased 1700% during this period, while bleached sulfite has declined 33%.

Before concluding too much from these production figures, the surviving sulfite pulp industry should be more closely examined. In 1980 (the last full year for which data are readily available), total U.S. sulfite pulp production was essentially equivalent to capacity, about 2.5 million tpy (see Table 2). About one third of this production was high-alpha (dissolving) pulp, and one half was produced for integrated operation. Most of the large sulfite market pulp mills made dissolving pulp as a primary product. Lesser quantities of specialty sulfite papermaking pulps were made in the same mills, the ratio of papermaking to dissolving pulp production being varied each year according to market conditions. At present, there are nine major sulfite pulp mills in the U.S. serving the market, and 15 which produce pulp only for integrated operations.

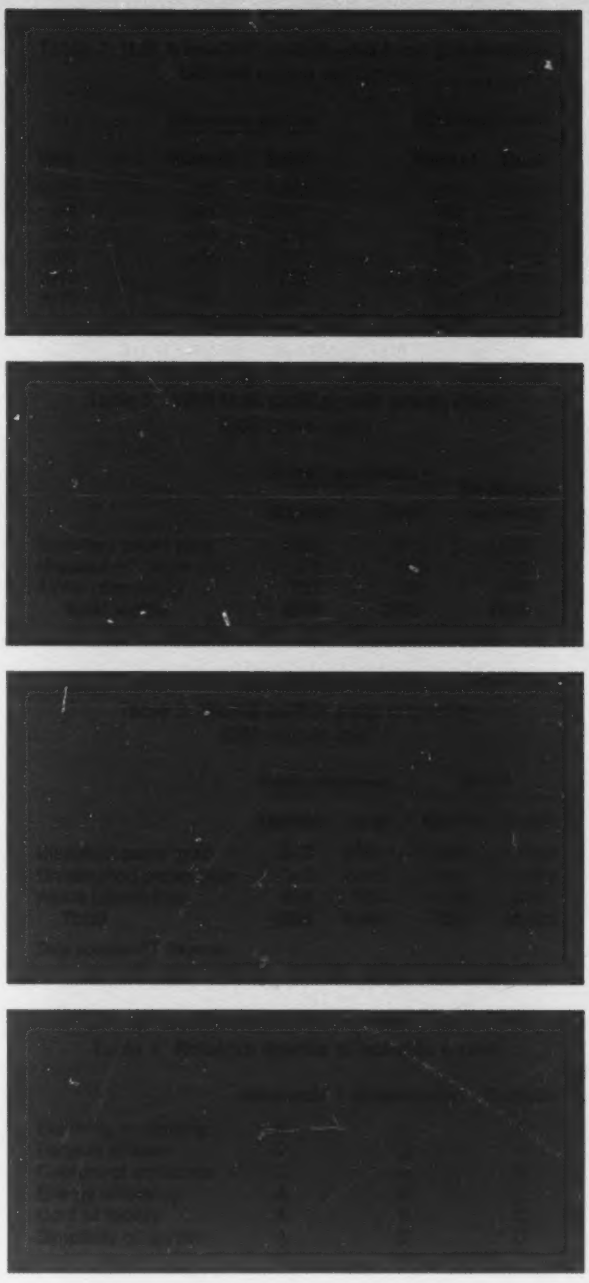
If the view is extended to Canada, a somewhat similar picture is seen. There are 35 sulfite pulp mills currently operating in Canada at a rate of 3 million tpy. Of these, nine sell about 785,000 tpy to the market. Most Canadian sulfite pulp is produced in relatively small mills and is blended with mechanical pulp for newsprint production.

Combined U.S. and Canadian sulfite production capacity is shown in Table 3. Total capacity figures in this table are believed to be reliable, but the split between market and integrated production, as well as between bleached paper pulp and dissolving pulp, is, as previously noted, a function of market conditions.

World sulfite pulp mill capacity is estimated to be close to 17 million tpy. Of this, almost one fourth is used in nonpaper products. The sulfite process continues to remain much more popular in western and eastern Europe than in Japan and North America.

Current strengths, weaknesses

Past expansion of sulfite paper pulp production has been inhibited by wood limitations, as previously noted. Many sulfite mills were small by today's standards and could not justify investment in secondary treatment and recovery boilers to meet environmental goals mandated by the government in the 1970s. Recovery-system technology had been late in developing.



On the other hand, softwood sulfite pulps have the following desirable characteristics: high brightness (typically five to six points better than kraft), softness, easy refining, good paper formation, smooth paper surface, minimal print picking, and low speck count. Because of these "advantages," sulfite continues to be used and even preferred in several papermaking applications, most of which may be described as "specialties."

Two major specialty applications for sulfite pulps are photo print papers (where high stable brightness, excellent formation, and special surfaces are required), and specialty papers for high-quality printing, writing, and

display purposes. These specialty papers (for example, creped tissue, which benefits from the softness of sulfite fibers, and greaseproof, glassine, and facsimile, matrix, and decor papers) are usually made by small mills to achieve characteristics distinct from those offered by high-volume producers. Sulfite finds a place here because of various specific characteristics. For newsprint, the chemical pulp portion (about 25%) continues largely to be sulfite, because the relatively high brightness of unbleached sulfite makes bleaching unnecessary.

Trend to soluble bases

Existing U.S. sulfite pulp mills will likely remain in production for a variety of reasons. First, U.S. mills and at least part of those in Canada, have now made an investment in environmental compliance. Although expensive, the total cost of recovery and secondary treatment, added to a well-maintained but partially depreciated pulp mill, should certainly produce substantially lower fixed costs than a new kraft pulp mill with capital cost in excess of $500,000/daily ton. Modern market sulfite mills have the benefit of as much up-to-date technology as a new bleached kraft pulp mill.

Most mills use one of three soluble bases: sodium, ammonia, or magnesium. Originally, all sulfite mills used calcium-base liquor prepared from the reaction of sulfur dioxide with limestone. Cooking was slow to allow penetration of the base into woodchips. A truly effective method for disposal of calcium base spent cooking liquor has not been found to date. The liquor is sometimes evaporated and burned (usually in a mixture with oil to maintain combustion) in a Loddby-type furnace. The base ends up as a gypsum slag or ash which cannot be reused. Sulfur dioxide generated during combustion must be reacted with the base in a scrubber. Only a few sulfite mills which practice recovery use calcium base.

Each of the soluble bases has a particular merit favorable to its use at a particular site. These merits are summarized in Table 4. For those mills manufacturing pulp for integrated paper operations, magnesium base is usually the choice. In this case, magnefite cooking (bisulfite cooking with very low free sulfur dioxide) gives a stronger fiber than conventional acid bisulfite cooking.

Mills manufacturing both dissolving pulp and specialty sulfite pulps generally prefer an ammonia base because of the simplicity of the recovery cycle and the bright, clean pulp that can be produced. A soda base permits combustion of soda-laden bleach plant effluent, either from an oxygen-alkali bleach stage or pressurized hot caustic extraction (dissolving pulp), as well as spent liquor from cooking.

Another alternative is two-stage cooking, practiced in Sweden and Finland, which requires sodium because of the volume of base which must be recycled. Normally, soda-base sulfite uses a reducing furnace similar to a kraft boiler. The sulfide smelt must be selectively oxidized back to the sulfite state, a somewhat complicated and energy-intensive process. For this reason, only a few conversions to the soda-base system have been made during the past decade.

Growing energy efficiency

A second favorable aspect for sulfite mills is energy efficiency. Modern sulfite recovery systems do not require recausticization, an excessively energy-intensive operation in the kraft process. The amount of base used in cooking is lower than with kraft, thus the "dead" load of inorganics carried around the recovery cycle is lower. Because of the lower lignin content in sulfite unbleached pulp, bleach chemical consumption is as much as one-third lower than comparable kraft pulp. While this is not an energy item directly at the mill, it represents lower energy consumption for sulfite on an absolute basis.

There is no inherent barrier to having a sulfite mill with labor efficiency as high as a modern kraft mill. The PWA Waldhof mill in Mannheim (West Germany) and the new Rosenthal mill in East Germany are examples. Both mills have Kamyr continuous digesters which facilitate spent liquor collection, sulfur dioxide recycling, product uniformity, and labor reduction. Kamyr, or modern pressure washers in the bleach plant, and computer process control also facilitate labor efficiency.

Outlook for markets

Modern sulfite mills produce pulp for end uses which have a reasonably good future. Many produce dissolving pulp as well as specialty paper pulps. While some cellulose-base fibers and films have shown a decline in Europe and the U.S. during the last decade (for example, cellophane, filament rayon, and regular rayon staple), the surviving segments of this industry appear to be well situated with regard to petrochemical base competitive materials. Some fiber and plastics producers in this area even forecast substantial growth potential later in this decade. Cellulose base chemicals, such as CMC (carboxymethyl cellulose) and methyl cellulose, continue to show growth. Furthermore, rayon and acetate production continue to expand in other parts of the world.

All of this means that the sulfite pulp producer who manufactures both dissolving and papermaking specialties expects to continue in this mode for the foreseeable future. It goes without saying that other types of papers, such as fine papers, book, and coated, currently using some sulfite also have a good outlook.

Finally, many market sulfite pulp mills have roll-finishing capability. This means that they are able to serve the "fluffing" market. Roll pulps are needed for most machines which produce diaper pads, hospital goods, and sanitary napkins. Sulfite pulp produced in a low-density sheet can be readily fluffed without undesirable neps (nits). Bulking and absorbency can be very good, provided the sulfite mills lower resin in the pulp and provide drying controls to deliver a product with uniform moisture content, sheet thickness, and softness. These same characteristics are needed in the raw material for the newly emerging dry-formed process. If, and when, dry forming becomes a significant factor in paper manufacture, favorable "fluffing" characteristics of sulfite pulp could become even more important than better inherent individual fiber strength characteristics of kraft pulp.

Significant developments

North American pulp and paper technologists showed considerable interest in the keynote speech of Lennart Stockman at the 1978 International Sulfite Conference. Stockman pointed out that, contrary to popular opinion, sulfite can be regarded as equal to kraft in properties such as runability, printability, and Z-direction strength.

(Continued on next page)

He concluded that the environmental position of a sulfite paper-pulp mill has been reversed compared with that of a kraft mill. Even overall energy consumption could effectively compete with mechanical pulp processes. In spite of Stockman's assertions, the question remains as to whether the sulfite process is at a turning point.

Several important technical advancements have taken place in the last few years that could have a significant impact on the future. Among the most recent of these, "neutral" sulfite/anthraquinone seems to be particularly noteworthy. A recent report of mill trials carried out in Finland by Rauma-Repola Oy and United Paper Mills Ltd. gave fully bleached pulps from pine and spruce with papermaking properties equal to kraft in all properties except tear. The bleached pulps were obtained at much higher yields, however.

High-yield, neutral sulfite-AQ pulps obtained in a yield range of 60% to 75% were reported to have similar linerboard properties compared with kraft obtained in a yield range of 52% to 55%. The cooking liquor in this process uses a mixture of sodium sulfite and sodium carbonate, thus it is not actually neutral. Anthraquinone is added to reduce the amount of cooking chemicals needed for effective delignification.

According to a recent report, the excellent properties of neutral sulfite/AQ pulp have encouraged United Paper Mills to embark on a modification program at its specialty paper mill in Tervasaari, Finland. UPM expects to initially produce 75,000 tpy of this pulp for integrated operation. Depending upon the project's success, further conversions to this process might be forthcoming. The driving force would be the yield improvement, particularly in Nordic countries which have very high wood costs and limited future potential for forest growth expansion.

Another development, recently updated, is multiple-stage cooking. Domsjo has reported improvements based on the two-stage Stora process. In this process, wood is first treated with hot sodium sulfite and then cooked with acid sodium bisulfite. The improvements consist of a method of mechanical deresinification and computer optimization of the cooking stages. Rauma has separately pioneered a three-stage process: sodium bisulfite, followed by acid bisulfite, and, finally, sodium carbonate. The Rauma recovery scheme, upgraded in the mid-1970s, is said to be no more complicated than the kraft system, and is able to avoid the energy-intensive recausticization stage of the latter.

The most recent sulfite developments can be loosely lumped into the category of ultra-high-yield sulfite. These developments involve a combination of very mild sulfite cooking with mechanical refining, and are primarily directed toward newsprint. Although overall yield from wood is somewhat less than TMP or conventional groundwood, the sulfite stage permits a major reduction in electrical consumption at the refiner. Major process development in this area has been made by CIP Inc. and Consolidated-Bathurst. Major R&D is currently in progress at the Pulp & Paper Institute of Canada.

In the meantime, some small sulfite mills in Canada have not yet made an investment in recovery facilities. Perhaps the most important thing that could happen to them is finding new uses for spent sulfite liquor. One major U.S. West Coast sulfite mill set a strategy for profitable spent liquor disposal by investing in R&D and marketing a spectrum of liquor-derived products ranging from oil-well-drilling mud additives to adhesives. The mill was aided in this task by the availability of an alcohol fermentation plant which permitted production of lignosufonates with low sugar content (spent sulfite liquor from conventional acid bisulfite pulping contains about 75% lignosulfonate and 25% wood-derived sugars).

Among the most recent proposals for spent liquor utilization are: adhesives for chipboard, molasses substitute in animal feeding, road binder, dispersant in cement manufacture, drilling-mud formulations, and formation fillers or dispersants in secondary oil recovery. The problem with all of these developments is that they usually require substantial capital for separation or upgrading procedures, along with innovative development and marketing efforts. While small sulfite mills are unlikely to generate the cash flow needed to support this type of activity, there is increasing evidence that a number of major companies and mills are directing their efforts in this area. The increased price of ethyl alcohol, particularly for use in motor fuel, has stimulated reexamination of spent liquor as a raw material. A considerable number of such plants have been built in Europe and the U.S.S.R., but only one is in operation in the U.S. Currently, the major inhibitor to such expansion of alcohol production is uncertainty about U.S. federal and state tax incentives.

Future prospects

Most forecasts of world pulp demand suggest growth will continue at historic rates. Since capital and manufacturing costs are likely to increase faster than the general rate of inflation, investment in new pulping capacity is likely to lag demand. Consequently, medium-term pulp shortages should guarantee survival of those sulfite mills which can meet local environmental requirements.

On the other hand, the psychological impact of strong progress in the kraft industry is likely to ensure that no new market sulfite mills will be built in North America or Japan. Added to this is the fact that most new pulping capacity in the U.S. will be added in the Southeast, which does not have much wood suitable for sulfite pulping. Much of Europe has a different orientation. Preference for sulfite pulp is related to continued wood availability and aversion to the odor generated by a kraft mill. For this reason, at least four or five major sulfite pulp mills are expected to be built in Central Europe and the U.S.S.R. during the next few years.

Commodity paper-pulps require a threshold volume of use to maintain a market. This volume is already present in the case of conventional bleached sulfite pulp, which is another main reason why the existing industry will probably continue to survive, especially if the total pulp market tightens up in the near future. Most likely, there will be no significant number of new market mills based on the new sulfite technology mentioned previously, primarily because each of the various process modifications yields a product somewhat different from what is now available in the market. On the other hand, many of these new sulfite modifications give pulp which is eminently suitable for a wide variety of papers. For this reason, it appears probable that some of the new processes will be applied to integrated operations. This would be particularly true of the ultra-high-yield sulfite process which holds some promise of being the next generation of papermaking beyond the current TMP vogue. □

Canadian industry faces off year but U.S., Europe should do better

U.S. will buy less Canadian pulp than in 1981, and labor settlements threaten Canada's competitiveness, CPPA annual meeting told

By DAVID R. ALLAN, News Editor

□ Canada's newsprint mills have lost some market share in the U.S. and those problems, plus anticipated reductions in U.S. imports of pulp this year, will push overall Canadian pulp, paper and board shipments down 1% in 1982, according to Canadian Pulp & Paper Assn. forecasts presented to the recent CPPA annual meeting in Montreal, Que. But U.S. and European industry officials told the gathering that their industries may ship about 1% more goods this year than in 1981.

Canadian mills have more to worry about in the long run than a one-year dip in production levels, however. CPPA president **Howard Hart** warned the meeting about a pair of dangers that threaten that country's long-term prospects in a decade that, he said, should see world pulp and paper consumption increase by 70 million metric tons.

The first danger Hart warned against is "overconfidence in our ability to prosper simply because we have such abundant natural resources." He cited the need for more intensive forest management, and noted that "dedication to industrial innovation has so far been unaccompanied by tax incentives which are in any way adequate to stimulate large increases in research and development."

Overblown nationalism

While Canada faces the new decade with confidence in its ability to compete in the world pulp and paper industry, Hart stated that it is also in danger of hampering itself by a kind of "overblown nationalism which can alienate our friends and lead us down a blind alley of increasing mistrust and bitterness, particularly in the U.S."

Hart noted that the Foreign Investment Review Act has imposed conditions on foreign-owned companies that "might easily be regarded as a form of economic extortion affecting their non-Canadian operations" and he hailed the U.S. move to take the issue to the General Agreement on Trade and Tariffs for resolution.

Hart also attacked Premier Trudeau's controversial National Energy Program as "the most prominent contributor to a higher level of tension in Canada/U.S. affairs."

Pointing to both the FIRA and NEP, Hart said than when, for political rather than economic reasons, "a U.S. publisher decides that, all things considered, he would rather buy his newsprint domestically," then "Canada is the loser."

Turning to the short-term prospects facing Canada, Hart predicted that, even if the economy turns around by midyear, Canadian pulp and paper shipments will be off by about 1% from 1981 levels. Duplicating that caution, CPPA pulp section manager **Brian McClay** told the meeting that U.S. demand for Canadian market pulp could fall by 5% in 1982, and that he expects less-developed countries will also cut their imports of Canadian pulp this year.

Quick turnaround possible

At the same time, however, Western Europe and Japan should modestly increase their purchases of Canadi-

Table 1. **Canadian pulp and paper shipments** (000 metric tons)

Grade	1980	1981*	1982e
Newsprint	8620	8860	8225
Printing/writing and sanitary	1895	1820	1975
Packaging papers and boards	2935	2900	2975
Pulp exports	7200	6600	6850
Total	20,650	20,200	20,025
By destination			
Domestic	4300	4430	4575
Export	16,250	15,770	15,450

*Shipments in 1981 affected by strikes which killed 900,000 metric tons capacity during the year.
e = estimate
Source: Canadian Pulp & Paper Assn.

an pulp. Thus, overall Canadian exports of pulp will drop by just 2%. And with producer inventories "still only equal to just over one month's supply," McClay noted, "it should be clear that when paper and board production does recover, the demand and supply of market pulp could be very rapidly in balance."

President of the American Paper Institute **Louis Laun** was less specific in his forecasts for the U.S. industry, but he did tell the CPPA meeting that "with growth in business activity of 1% in 1982 and 5% in 1983, the demand for paper and paperboard will grow at about the same rate."

The U.S. Gross National Product assumption his forecast is tied to is more optimistic than CPPA estimates, however: CPPA expects the U.S. GNP to remain flat this year, while Wood Gundy Ltd. chief economist **Dr. John Grant** told the meeting he expects the Canadian GNP to fall by 0.8% in 1982.

European political uncertainty

Europe's economy won't be performing much better than the North American economies, according to **Albert de Monts** of the European Confederation of Pulp, Paper & Board Industries. De Monts forecast European Community economic growth of 1% to 2%—with the outlook clouded by political and monetary uncertainty.

European paper and board production will roughly match that increase, coming after a year in which production actually fell by 1% to slightly below 24 million metric tons.

Only West Germany and Finland showed significant gains in production, while France and Italy were level, and the U.K. and Sweden saw "distinctly less" production. German Pulp & Paper Assn. general director **Dr. M. Braunsperger** told the meeting German production rose 2%, but demand fell by 1% to 2%.

Indeed, European production has been hampered by a "drastic" reduction in the average annual growth rate of consumption, with Europe unlikely to double its per capita consumption in the forseeable future to approach U.S. per capita consumption, according to de Monts. Production in the E.C. from 1967 to 1972 grew at 4.5%/year but climbed at only 2.7%/year from 1976 to 1980, slowing even further in 1981 and 1982.

U.S. near record

U.S. production rose by 1.5% for 1981 and fell just 100,000 tons short of the 64.6 million-ton record set in 1979, with woodpulp production actually rising 2% to a record 54 million tons, according to Laun—and this in spite of a "sharp" downturn in the closing weeks of the year brought about by a 4.4% reduction in U.S. industrial production during the fourth quarter.

But weakness in overseas economies cut U.S. exports by about 9.6%, with linerboard export shipments sliding by 24% and pulp by 3.5%. Bleached board exports edged down 1.9% while printing/writing papers shot up by 15.3% to 391,000 tons.

Printing/writing order backlogs

That dramatic export success record was not matched in all areas of the U.S. printing and writing paper industry, however, Champion International Corp. vice president-planning and development **Bartley L. Reitz** told the gathering. Indeed, for U.S. printing and writing paper mills as a whole in 1981, "there was very little growth from 1979."

Order backlogs for those mills fell to an average of below 20 days, from around 30 days in 1979, according to API statistics cited by Reitz. "Although the backlog for most producers is not so bad as it was in 1975, it is presently very thin and large amounts of curtailment were taken by the industry in December, the worst month I can remember since '75," he noted.

Coated papers have done better than had been expected, he pointed out, with 1981 coated free-sheet paper shipments coming in 14% above what Reitz had forecast in November 1980. But coated free-sheet mills will suffer in 1982 as lightweight coated groundwood mills, which are plagued by excess capacity, take market share from free sheet in some areas.

Reitz expects to see shipments of coated two-side grades Nos. 1-4 fall by 3%, while No. 5 increases by 5.5%. He believes that commercial printing and direct mail catalog end-uses will continue to soak up more No. 5, countering the largely flat trend of magazine paper consumption.

Poor LWC operating rates

Even with that kind of output growth rate, however,

Table 2. Printing/writing paper shipments, 1981-82
(000 tons)

Grade	1981e	1982e
Uncoated free sheet total	7870	7907
Offset	1990	1981
Copy/duplicating (BMOX)	1911	1949
Forms bond	1569	1569
Envelope	854	893
Tablet	322	325
Text & cover	239	230
Other	986	990
Total coated paper	4947	5015
Coated one-side	440	430
Coated two-sides Nos. 1-4	1990	1930
Coated two-sides No. 5	2517	2655
Operating rates		
Uncoated free sheet	90.5%*	88%
Coated groundwood	92.0*	84
Coated free sheet	94.0*	94

e = estimate
* Pulp & Paper Week estimates
Source: American Paper Institute & Champion International Corp.

Table 3. Coated paper shipments to magazine publishers, 1978-81
(000 tons)

Grade	1978	1979	1980	1981
Coated two-sides, total	1902	1835	1969	2009
Nos. 1-4	365	400	405	408
No. 5	1537	1439	1564	1601
All grades	2064	2017	2125	2165
Coated paper imports	214	169	116	36

Source: American Paper Institute and Champion International Corp.

LWC mills will see their operating rates deteriorate this year, as substantial new capacity comes on-stream. Operating rates will be in the low 80s by the second half—falling as low as 80% at mid-year when three new machines start up—and Reitz feels LWC operating rates will be "poor" until 1986.

One result of this capacity surge—at the same time as a jump in European and Japanese LWC capacity—will be a shakeout of uneconomic, small machines, while another will be cancellation of some contemplated projects, he predicted.

Last year's downturn in the U.S. uncoated free-sheet industry should begin to reverse itself this year, with operating rates reaching a respectable 93% in the fourth quarter from a first-period low of 85%—and heading into an "excellent" 1983.

Major factors in the improvement will be an end to the slide in bond/mimeo/duplicating/xerographic papers and offset papers, which will be more than enough to counteract a turn to flat growth on the part of forms bond.

Growth in cut-size papers and in the previously robust forms bond sector will be hampered early in the year by excessive user inventories, Reitz believes, but he thinks those surpluses will be worked off by the end of the first quarter.

Justifying capital investment

One symptom of economic weakness and growing inventories in the last year has been softness in printing/writing paper prices. Reitz noted that in the present situation, price levels as a percentage of what is needed to justify capital investments are only 70% in the case of new hardwood pulp mills, 85% with coated free-sheet web paper machines at existing mills, and 90% for uncoated free-sheet commodity-grade paper machines at existing mills.

But the U.S. printing/writing paper industry has short-term worries, too: Reitz noted that his GNP forecast, calling for 1% growth in 1982, is "on the high side of most forecasts I have seen." If the U.S. economy "fails to perform as I described, then my forecasts for white paper shipments are nonoperable," he added.

Pulp to Japan

Economic softness in the U.S. paper industry and in other countries that buy from Canada has an effect on purchases of Canadian pulp, both Reitz and McClay noted.

Canadian pulp shipments to the U.S. dropped by 4%, while European paper mill downtime both early and late in the year cut Canadian shipments to that market by about 9%, McClay said. A government-backed curtailment program in Japan cut Canadian pulp shipments to Japan by approximately a third, and new orders from China virtually disappeared during 1981, McClay added.

A 5% increase in Canadian newsprint shipments to the domestic market and 18% increase in shipments overseas were barely enough to offset a 1% drop in Canadian shipments to the U.S. brought about by a shift of U.S. newspapers to new U.S. capacity. Canadian newsprint shipments overall climbed by 3%, but CPPA thinks the 1982 shipment level might drop by 7%.

Consumption in the U.S. rose only 0.5% to 10.1 million metric tons in 1981, and the group thinks 1982 consumption will drop 1% following a decline in U.S. advertising that is predicted for 1982 by CPPA.

Canadian labor worries

Eastern Canadian pulp and paper producers can't grant the kind of wage increases sought by the Canadian Paperworkers Union in contract negotiations this year because of weak market conditions, **Raymond R. Pinard**, Domtar Inc. executive vice president and CPPA chairman, told the meeting.

The CPU, which represents most pulp and paper workers in Eastern Canada, feels the industry's claims of hardship are "window dressing," and is seeking wage increases of about 15% for each year of a two-year contract, plus improvements in benefits and inclusion of a cost-of-living increase clause.

Citing overcapacity in such grades as newsprint, threats from plastics in such markets as packaging, and higher operating costs for Canadian manufacturers to produce a ton of paper than for U.S. producers, Pinard disputed the union's claims that Eastern Canadian industry is distorting its profit picture.

"Surely we and our partners, the unions, can find a formula which can assure the continuing good health of our industry," he said. □

Table 4. **Printing/writing paper shipments, 1981-82**
(000 tons)

Grade	1981e	1982e
Uncoated free-sheet total	7870	7907
Offset	1990	1981
Copy/duplicating (BMDX)	1911	1948
Forms bond	1589	1569
Envelope	854	863
Tablet	322	325
Text & cover	239	230
Other	985	990
Total coated paper	4947	5015
Coated one-side	440	430
Coated two-sides, Nos. 1-4	1990	1930
Coated two-sides, No. 5	2517	2655
Operating rate		
Uncoated free-sheet	90.5%*	88%
Coated groundwood	92.0*	84
Coated free-sheet	94.0*	94

e—estimate.
*Pulp & Paper estimate.

Coated paper shipments to magazine publishers, 1979-81
(000 tons)

Grade	1979	1979	1980	1981
Coated two-sides (total)	1902	1838	1869	2009
Nos. 1-4	365	400	405	408
No. 5	1537	1438	1564	1601
All grades	2054	2017	2125	2165
Coated paper imports	214	189	113	36

Source: American Paper Institute and Champion International Corp.

Polyvinyl alcohol use holding steady

By BARRY SHOCKETT

In general, polyvinyl alcohol (PVA) markets have been relatively static the past four years, although there was a slight surge in 1979. An improvement in the U.S. economy could stimulate domestic sales, but most producers are aiming their expanded capacity for export markets. The overall market depends heavily on the textile industry, which should follow the overall economy.

The PVA industry operating rate was down to 71% in 1981, vs 74% and 77% in 1980 and 1979, respectively.

The Canadian PVA market is quite small and will not exceed 10 million lb before 1985. Paper industry use should increase, but this is a very small market.

U.S. statistics for polyvinyl alcohol (million lb)

	1978	1979	1980	1981e
Nameplate capacity	190	190	190	203
Production*	127	147.7	140.6	144.5
Imports	17.5	22	21	24
Exports	13	25	13	24.5
Apparent consumption	131.5	144.7	148.6	144
Total sales (SPI)	133	148.5	128.5	136
Total demand†	137.5	145.5	136.5	135.5
Paper coatings	11	11.6	10.9	10.8

*excluding production for PVB
†total sales less exports plus imports

Sources: SPI Inc.; Bureau of Census, Foreign Trade Div.

Canadian statistics for polyvinyl alcohol (000 short tons)

	1978	1979	1980	1981e
Nameplate capacity	0.22	0.22	0.22	0.28
Production	0.2	0.2	0.2	0.2
Total demand	3.9	4.2	3.8	3.8
Paper coating	0.09	0.08	0.06	0.07
Imports	3.7	4	3.6	3.6

POLYVINYL ALCOHOL

UNITED STATES

Uses: PVA is used by the paper industry mainly as a surface size for printing and writing papers and paperboard, and as a coating binder. Other uses include textiles, adhesives, emulsifiers, and films.

Demand: In 1981, estimated total U.S. PVA demand (excluding that used for polyvinyl butyral (PVB) production) was 135.5 million lb. The paper industry used 10.5 to 11 million lb (8%) for sizing and coating. The textile industry is the largest user, consuming about 50%, while adhesives take 25%. Demand was down slightly from the previous year's 136.5 million lb, but well under the 1979 figure of 145.5 million lb.

Sources: There are three domestic suppliers (Dupont, Monsanto, and Air Products & Chemicals), which derive PVA from the hydrolysis of polyvinyl acetate. Imports have increased from about 13% of the total in 1978 to an estimated 17.5% in 1981, when 24 million lb were imported, mainly from Japan and Taiwan. PVA is available at various viscosity levels and degrees of hydrolysis.

Availability: Industry capacity is sufficient to meet current demand and no shortages are likely in the future, as suppliers are expanding their capacity. 1981, market; 1980, market; 1979, market; 1978, market.

Pricing: The current published list price of $1.05/lb for truckload quantities went into effect last summer and should not change before the second half of 1982. Pricing history: 1981, $1.00-$1.05/lb, delivered basis; 1980, 86.5¢-91.5¢/lb; 1979, 77.5¢/lb; 1978, 69.5¢/lb.

Forecast: Paper industry demand for PVA should parallel fine paper growth of about 3% to 4%/year. Growth in PVA use in paper coating is expected to be slow, or even flat, through 1985, except for certain specialty applications. Overall consumption should increase 6% to 7%/year due to stronger textile and adhesive markets. Adhesive use could grow 5% to 8%/year. Escalating pulp prices could lead to the utilization of higher filler loadings, which could spur PVA use as a sizing agent.

CANADA

Uses: Polyvinyl alcohol is employed as a surface size on fine papers and for water and grease resistance on specialty grades. The major end-use for PVA is for textile warp sizing.

Demand: Canadian paper industry demand for PVA in 1981 was an estimated 70 tons or 2% of the total. Total PVA consumption in 1980 and 1981 was 3800 tons. Textile applications consumed 2700 tons or 70% in 1981. Adhesives used about 700 tons (18.5%).

Sources: There is one small Canadian producer, Actol Chemicals, which uses most of its output captively. The bulk is imported from offshore and U.S. In 1980, more than 60% of the imports came from Japan and Taiwan.

Availability: PVA should be readily available since imports can easily meet the small tonnage required and no shortages are forecast. Supplies have been adequate for several years.

Pricing: Textile-grade PVA is listed at an average price of US$1.22/lb, freight allowed, Ont./Que. However, pressure from imports has dropped this to as low as C85¢, down from the 1981 level of 90¢-95¢/lb. Pricing history (list prices, U.S. funds): 1981, 75.3¢-$1.13/lb; 1980, 75.3¢/lb; 1979, 46.6¢-75.3¢/lb; 1978, 47.6¢/lb.

Forecast: Most markets have been relatively static recently and no change is forecast for 1982. Over the longer term, a modest increase in demand is likely. The adhesives markets should grow between 6% to 7%/year through 1985.

Mr. Shockett is consulting editor-chemical markets for PULP & PAPER.